

Amendment
Application No. 10/773,448
Attorney Docket No. 042077

REMARKS

Claims 1-6 and 8-24 are pending in the present application. Claim 1 is herein amended. Claim 7 is cancelled. Claims 8-24 are withdrawn. No new matter has been added to the application.

Claim Rejections

Amended claim 1 recites a refrigeration cycle apparatus comprising a refrigeration circuit using carbon dioxide as the refrigerant. The refrigeration circuit has a throttling means which includes a plurality of capillary tubes. The refrigerant circulation into each capillary tube is controlled so that a flow path resistance of the throttling means is variable, and the flow path resistance of the throttling means at the time of starting the compressor is reduced.

The compressor includes first and second compression elements driven by a driving element. The refrigerant is sucked into the first compression element from the low-pressure side of the refrigerant circuit and compressed, and the refrigerant discharged from the first compression element and having an intermediate pressure is sucked into the second compression element, compressed, and discharge to the gas cooler. (Specification, pages 15-16; Original claim 7.)

An intermediate cooling circuit is used to cool the refrigerant from the fist compression element before the refrigerant is sucked into the second compression element. (Specification, page 16.)

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An internal heat exchanger is used to exchange heat from the refrigerant on the high pressure side flowing from the gas cooler to the refrigerant on the low pressure side flowing from the evaporator. (Specification, page 17.)

A. Rejection Based on *Marques*

Claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over *Marques* (WO 96/19704; disclosed in the IDS filed November 16, 2004). Favorable reconsideration is requested.

Marques discloses a refrigeration system for refrigeration appliances. The system includes a condenser 2, a compressor 1, an evaporator 3 and a refrigerant fluid flow restricting means 10. The flow restricting means comprises two parallel capillary tubes. One of the capillary tubes has a flow blocking means 20 to selectively and temporarily allow the refrigerant fluid to pass through at least part of the capillary tubes when the temperature sensor detects a temperature condition.

Applicants respectfully submit that *Marques* does not disclose that “carbon dioxide is used as the refrigerant” and that “the compressor includes first and second compression elements driven by a driving element” as recited in amended claim 1.

When carbon dioxide is used as the refrigerant, the refrigeration cycle operates with the high-pressure side at a very high pressure (supercritical pressure). If a compressor has a single stage, the load of the compression element will be very heavy when using carbon dioxide as the

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refrigerant. If carbon dioxide was used as the refrigerant in the refrigeration cycle of Marques, sufficient cooling performance would not be obtained.

The Examiner takes the position that Marques is capable of operating using a two-stage compressor using carbon dioxide as the refrigerant. (Office Action, page 2.) However, even though Marques may be capable of using a two-stage compressor, Marques does not disclose using a two-stage compressor. Since Marques does not disclose using a two-stage compressor, Marques is not capable of operating when carbon dioxide is used as the refrigerant. Therefore, Marques does not disclose the elements as recited in claim 1.

Regarding claims 2 and 3, Applicants respectfully submit Marques does not disclose a second capillary tube “whose flow path resistance is smaller than that of the first capillary tube.”

Marques discloses that a first capillary tube allows for adequate refrigerant fluid flow for normal operation of the system. (Page 5, lines 6-10.) In addition, Marques discloses that the second capillary tube allows for increased flow of refrigerant fluid in the system. (Page 5, lines 11-15.) However, Marques does not disclose the relative flow path resistance between each capillary tube as claimed. Since Marques does not disclose that the flow path resistance is smaller in the second capillary tube relative to the first capillary tube, Tokuhisa does not disclose the elements as recited in claims 2 and 3.

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Regarding claim 4, Applicants respectfully submit that Marques does not disclose that “the flow path resistance of the throttling means is reduced or the refrigerant is passed into the second capillary tube for a predetermined time from the starting of the compressor.”

The Examiner takes the position that operating for a predetermined time and operating until reaching a predetermined temperature is equivalent, and that it is a design choice for selecting which method to use. However, reducing flow path resistance for a predetermined time is not equivalent to reducing flow path resistance until a predetermined temperature is reached. The time for reaching a predetermined temperature is variable and is not predetermined. Therefore Marques does not disclose the elements as recited in claim 4.

B. Rejection Based on *Tokuhisa*

Claims 1-4 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over *Tokuhisa* (JP 04203757; disclosed in the IDS filed November 16, 2004). Favorable reconsideration is requested.

Tokuhisa discloses an air-conditioner having a compressor 1, a condenser 2, parallel capillary tubes 3 and 6, a vaporizer 4, and an accumulator 5. A valve 7 controls flow through capillary tube 6. Valve 7 is opened for a specified time during start up of the air-conditioner.

Applicants respectfully submit that *Tokuhisa* does not disclose that “carbon dioxide is used as the refrigerant” and that “the compressor includes first and second compression elements driven by a driving element” as recited in amended claim 1.

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When carbon dioxide is used as the refrigerant, the refrigeration cycle operates with the high-pressure side at a very high pressure (supercritical pressure). If a compressor has a single stage, the load of the compression element will be very heavy when using carbon dioxide as the refrigerant. Since Tokuhisa does not disclose a compressor which includes first and second compression elements, if carbon dioxide is used as the refrigerant in the refrigeration cycle of Tokuhisa, sufficient cooling performance would not be obtained. Thus, Tokuhisa does not disclose the elements as recited in claim 1.

Regarding claims 2 and 3, Applicants respectfully submit Tokuhisa does not disclose a second capillary tube "whose flow path resistance is smaller than that of the first capillary tube."

Tokuhisa discloses two parallel capillary tubes 3 and 6. However, *Tokuhisa* does not disclose the relative flow path resistance between each capillary tube as claimed. The Examiner takes the position that smaller resistance is inherent in capillary tube 6. (Office Action, page 3.) However, this statement is incorrect. The flow path resistance of the capillary tubes will be reduced when valve 7 is opened no matter what the flow resistance is in capillary tube 6 relative to capillary tube 3. When valve 7 is opened, refrigerant flows into capillary tube 6 in addition to capillary tube 3. Thus flow resistance is reduced. Since Tokuhisa does not disclose that the flow path resistance is smaller in the second capillary tube relative to the first capillary tube, Tokuhisa does not disclose the elements as recited in claims 2 and 3.

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C. Rejection Based on *Fukuchi*

Claims 1 and 2 were rejected under 35 U.S.C. § 102(b) as being anticipated by *Fukuchi* (JP 06050646). Favorable reconsideration is requested.

Fukuchi discloses a refrigerator having a compressor 11, a condenser 12, capillary tubes 21, 22 and 23 controlled by valves 24, 25 and 26 respectively, and a cooler 7.

Applicants respectfully submit that *Fukuchi* does not disclose that “carbon dioxide is used as the refrigerant” and that “the compressor includes first and second compression elements driven by a driving element” as recited in amended claim 1.

When carbon dioxide is used as the refrigerant, the refrigeration cycle operates with the high-pressure side at a very high pressure (supercritical pressure). If a compressor has a single stage, the load of the compression element will be very heavy when using carbon dioxide as the refrigerant. Since *Fukuchi* does not disclose a compressor which includes first and second compression elements, if carbon dioxide is used as the refrigerant in the refrigeration cycle of *Fukuchi*, sufficient cooling performance would not be obtained. Thus, *Fukuchi* does not disclose the elements as recited in claim 1.

For at least the foregoing reasons, claims 1-7 are patentable over Marques, Tokuhisa, and *Fukuchi*.

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Accordingly, withdrawal of the rejection of claims 1-7 based on Marques, claims 1-4 based on Tokuhisa, and claims 1 and 2 based on Fukuchi is hereby solicited.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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